

Linear guideways

Linear guideways: Series

3. Linear guideways: Series

3.1 HG/QH series

3.1.1 Properties of the HG and QH series linear guideways

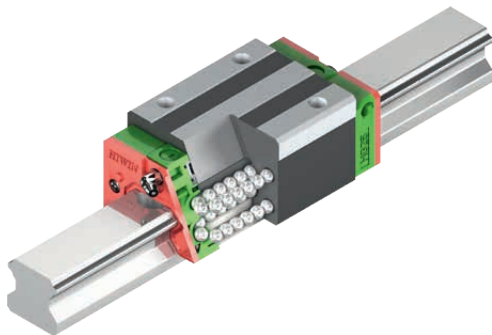
Standard series in X arrangement. The HIWIN linear guideways of the HG series with four ball tracks are designed for high loads and rigidities. Due to the 45° arrangement of the ball tracks, the HG series can take loads from all directions equally.

Low displacement forces and high efficiency are additional features of the HG series. The ball retainers prevent the balls from falling out when pulled from the profile rail during installation of the blocks.

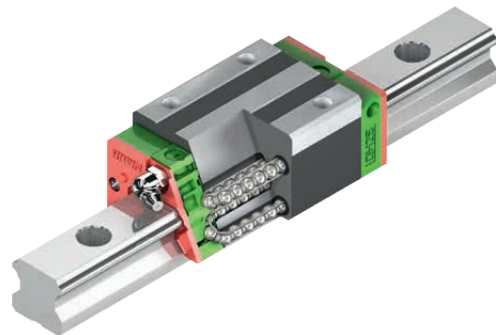
The models of the QH series with SynchMotion™ technology offer all the advantages of the standard HG series. Controlled movement of the balls at a defined distance also results in improved synchronous performance, higher reliable travel speeds, extended lubrication intervals and less running noise. Since the installation dimensions of the QH blocks are identical to those of the HG blocks, they are also mounted on the HGR standard rail and can thus be easily interchanged. For further information, see Page 26. Sizes 15, 20 and 25 are also available in corrosion-resistant steel.

3.1.2 Layout of HG/QH series

- Four-row recirculating ball bearing guide
- 45° contact angle of the ball tracks
- The ball retainers prevent the balls from falling out when the block is removed
- Different sealing variants, depending on application area
- 6 connection options for lubricating nipples
- SynchMotion™ technology (QH series)
- Size 15, 20, 25 also available in corrosion-resistant steel



Layout of HG series



Layout of QH series

Advantages:

- Backlash-free
- Exchangeable
- High accuracy
- Highly resilient in all loading directions
- Low friction losses even with preload from optimised ball tracks and 2-point contact

Additional advantages of QH series:

- Improved synchronous performance
- Optimised for higher travel speeds
- Extended relubrication intervals
- Reduced running noise
- Higher dynamic load rating

3.1.3 Order codes of HG/QH series

For HG/QH linear guideways, there is a distinction made between assembled and non-assembled models. The dimensions of both models are the same. The main difference is that, in the unassembled models, blocks and profile rails can be freely interchanged. Block and profile rail can be ordered separately and mounted by the customer. Their accuracy reaches class P.

Order code for linear guideway (assembled)

Series:	W	25	C	C	2	R	1600	Z0	H	M	2	DD	E2	CTS
Series: _____ HG QH Type: _____ W: Flange block H: High square block L: Low square block (HG only) Size: _____ HG: 15, 20, 25, 30, 35, 45, 55, 65 QH: 15, 20, 25, 30, 35, 45 Load class: _____ S: Average load (HG only) C: Heavy load H: Super heavy load Block fastening: _____ A: From above C: From above or below Number of blocks per profile rail _____ Profile rail mounting: _____ R: From above T: From below													Coating: None: No coating CTS, CZS, CCB None: Standard E2: Long-term lubrication unit SE: Steel deflector ³⁾ Dust protection²⁾: None: Standard (SS) SSL ³⁾ , ZZ, ZZX ³⁾ , DD, KK, KKX ³⁾ , SW ³⁾ , ZW, ZWX ³⁾ Rails per axis¹⁾ Without: Standard M: Corrosion-resistant steel ⁴⁾ Accuracy class: C, H, P, SP, UP Preload identifier: Z0, ZA, ZB Profile rail length [mm]	

Order code Carriage (not mounted)

Series:	W	25	C	C	Z0	H	M	ZZ	E2
Series: _____ HG QH Type: _____ W: Flange block H: High square block L: Low square block (HG only) Size: _____ HG: 15, 20, 25, 30, 35, 45, 55, 65 QH: 15, 20, 25, 30, 35, 45 Load class: _____ S: Average load (HG only) C: Heavy load H: Super heavy load									None: Standard E2: Long-term lubrication unit Dust protection²⁾: None: Standard (SS) SSL ³⁾ , ZZ, ZZX ³⁾ , DD, KK, KKX ³⁾ , SW ³⁾ , ZW, ZWX ³⁾ Without: Standard M: Corrosion-resistant steel ⁴⁾ Accuracy class: C, H, P Preload identifier: Z0, ZA, ZB Block fastening: A: From above C: From above or below

Note:

¹⁾ The number 2 is also a quantity indication, i.e. one piece of the article described above consists of one pair of rails.

No number is given for single profile rails. In the case of multi-part rails, the joint is offset as standard.

²⁾ An overview of the individual sealing systems can be found on Page 24

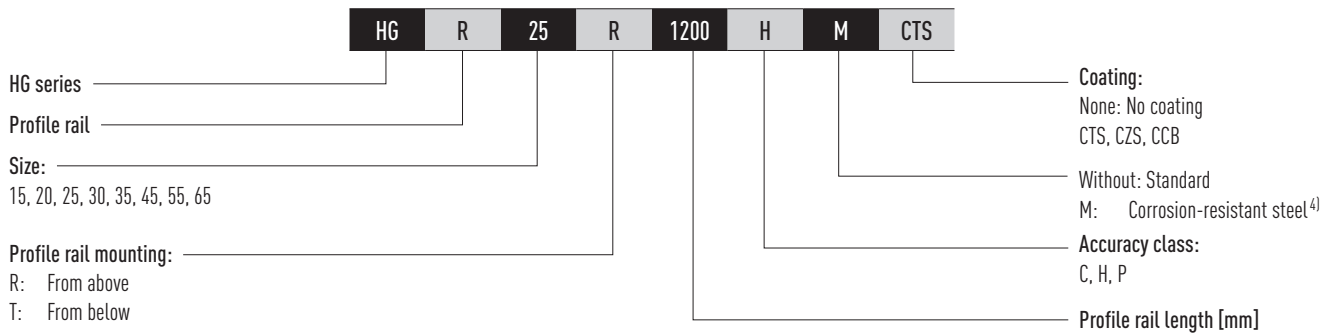
³⁾ Not available for QH

⁴⁾ Corrosion-resistant steel available in: HG series, H and W type, size 15-25, load type C, preload Z0 and ZA, accuracy class H. More information in chapter 2.12.4

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HG/QH series

Order number of profile rail (not assembled)

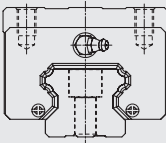
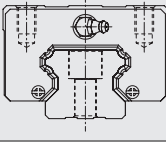
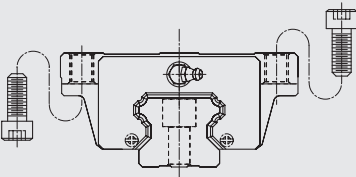


Note:

⁴⁾ Corrosion-resistant steel available in: HG series, H and W type, size 15-25, load type C, preload Z0 and ZA, accuracy class H. More information in chapter 2.12.4

3.1.4 Block types

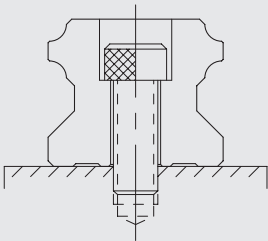
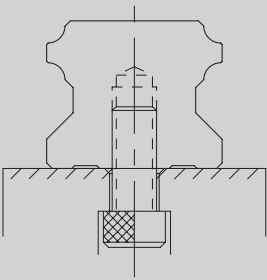
HIWIN offers block and flange blocks for its linear guideways. Due to the low installation height and the larger mounting surface, flange blocks are better suited for large loads.

Table 3.1 Block types				
Type	Series/size	Layout	Height [mm]	Typical applications
High square type	HGH-CA HGH-HA		28 – 90	– Machining centres – NC lathes – Grinding machines – Precision milling machines – High performance cutting machines – Automation technology – Transport technology – Measuring technology – Machines and devices with high required positioning accuracy
Low square type	HGL-CA HGL-HA		24 – 70	
Flange type	HGW-CC HGW-HC		24 – 90	

¹⁾ Optional type on request

3.1.5 Profile rail types

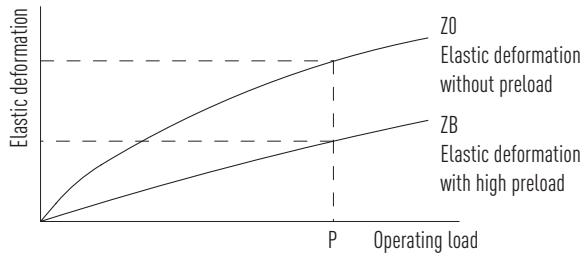
In addition to profile rails with standard fastening from above, HIWIN also offers rails for fastening from below.

Table 3.2 Profile rail types	
Fastening from above	Fastening from below
	
HGR_R	HGR_T

3.1.6 Preload

Definition

Each linear guideway can be preloaded via the ball size. The curve shows that the rigidity doubles at high preload. The HG/QH series of linear guideways offers three standard preloads for different applications and conditions.



Preload identifier

Table 3.3 Preload identifier				
Identifier	Preload		Application	Example applications
Z0	Slight preload	$0 - 0.02 C_{dyn}$	Constant load direction, little vibration, less accuracy required	– Transport technology – Automatic packaging machines – X-Y axis in industrial machines – Welding machines
ZA	Medium preload	$0.05 - 0.07 C_{dyn}$	High accuracy required	– Machining centres – Z axes in industrial machines – Eroding machines – NC lathes – Precision X-Y table – Measuring technology
ZB	High preload	Over $0.1 C_{dyn}$	High rigidity required, vibration and jolting	– Machining centres – Grinding machines – NC lathes – Horizontal and vertical milling machines – Z-axis of machine tools – High performance cutting machines

Linear guideways

HG/QH series

3.1.7 Load ratings and torques

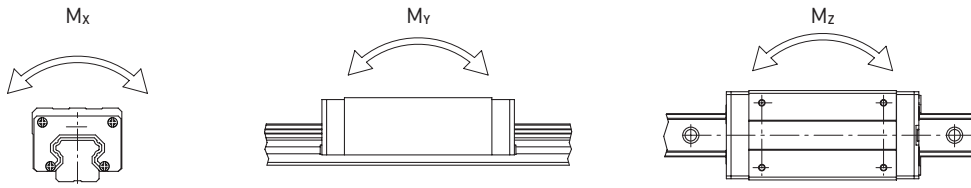


Table 3.4 Load ratings and torques for series HG/QH

Series/Size	Dynamic load rating C_{dyn} [N] ¹⁾	Static load rating C_0 [N]	Static moment [Nm]		
			M_{0x}	M_{0y}	M_{0z}
HG_15C	14,700	23,470	120	140	140
QH_15C	17,940	19,860	100	112	112
HG_20S	16,840	22,570	130	80	80
HG_20C	27,100	36,680	270	280	280
QH_20C	30,000	33,860	260	266	266
HG_20H	32,700	47,960	350	480	480
QH_20H	35,700	42,310	310	370	370
HG_25S	26,930	36,560	310	160	160
HG_25C	34,900	52,820	420	490	490
QH_25C	41,900	48,750	390	460	460
HG_25H	42,200	69,070	560	730	730
QH_25H	50,610	60,940	500	576	576
HG_30C	48,500	71,870	660	700	700
QH_30C	58,260	66,340	600	660	660
HG_30H	58,600	93,990	880	1,230	1,230
QH_30H	70,320	88,450	830	1,190	1,190
HG_35C	64,600	93,990	1,160	1,090	1,090
QH_35C	78,890	86,660	1,070	1,022	1,022
HG_35H	77,900	122,770	1,540	2,020	2,020
QH_35H	95,230	115,550	1,450	1,919	1,919
HG_45C	103,800	146,710	1,980	2,350	2,350
QH_45C	119,400	135,420	1,830	2,092	2,092
HG_45H	125,300	191,850	2,630	4,450	4,450
QH_45H	144,130	180,560	2,470	4,002	4,002
HG_55C	153,200	211,230	3,690	3,684	3,684
HG_55H	184,900	276,230	4,880	6,650	6,650
HG_65C	213,200	287,480	6,650	5,870	5,870
HG_65H	277,800	420,170	9,380	12,574	12,574

¹⁾ Dynamic load rating for 50,000 m travel path

3.1.8 Rigidity

The rigidity depends on the preload. With the formula F 3.1, the deformation can be calculated depending on the rigidity.

F 3.1

$$\delta = \frac{P}{k}$$

δ Deformation [μm]
 P Operating load [N]
 k Rigidity value [N/ μm]

Table 3.5 Radial rigidity of HG/QH series

Load type	Series/ Size	Rigidity depending on the preload		
		Z0	ZA	ZB
Average load	HG_20S	124	210	270
	HG_25S	195	320	360
Heavy load	HG_15C	196	365	483
	QH_15C	174	292	384
	HG_20C	232	460	678
	QH_20C	221	396	542
	HG_25C	292	539	705
	QH_25C	254	419	548
	HG_30C	354	618	823
	QH_30C	326	526	716
	HG_35C	395	642	865
	QH_35C	375	566	762
	HG_45C	505	738	980
	QH_45C	480	644	850
	HG_55C	609	828	1,092
	HG_65C	716	918	1,201
Super heavy load	HG_20H	300	611	824
	QH_20H	294	534	735
	HG_25H	378	715	935
	QH_25H	332	567	739
	HG_30H	453	820	1,093
	QH_30H	420	699	945
	HG_35H	509	855	1,150
	QH_35H	487	757	1,010
	HG_45H	649	970	1,298
	QH_45H	620	853	1,128
	HG_55H	789	1,085	1,445
	HG_65H	946	1,221	1,599

Unit: N/ μm

3.1.9.2 HGL

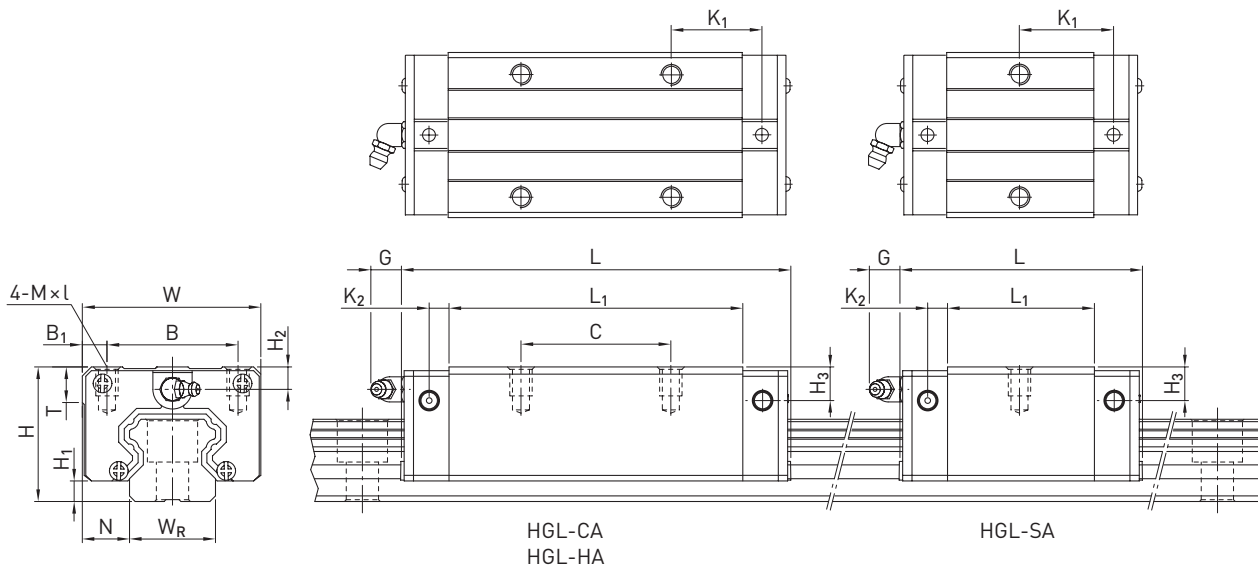


Table 3.7 Dimensions of the block

Series/size	Installation dimensions [mm]			Dimensions of the block [mm]													Load ratings [N]		Weight [kg]
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	M × l	T	H ₂	H ₃	C _{dyn}	C ₀	
HGL15CA	24	4.3	9.5	34	26	4.0	26	39.4	61.4	10.00	4.85	5.3	M4 × 4	6.0	3.95	3.7	14,700	23,470	0.14
HGL25SA	36	5.5	12.5	48	35	6.5	—	38.2	64.2	23.20	6.00	12.0	M6 × 6	8.0	6.00	5.0	26,930	36,560	0.32
HGL25CA							35	58.0	84.0	15.70							34,900	52,820	0.42
HGL25HA							50	78.6	104.6	18.50							42,200	69,070	0.57
HGL30CA	42	6.0	16.0	60	40	10.0	40	70.0	97.4 ¹⁾	20.25	6.00	12.0	M8 × 10	8.5	6.50	10.8	48,500	71,870	0.78
HGL30HA							60	93.0	120.4 ²⁾	21.75							58,600	93,990	1.03
HGL35CA	48	7.5	18.0	70	50	10.0	50	80.0	112.4	20.60	7.00	12.0	M8 × 12	10.2	9.00	12.6	64,600	93,990	1.14
HGL35HA							72	105.8	138.2	22.50							77,900	122,770	1.52
HGL45CA	60	9.5	20.5	86	60	13.0	60	97.0	139.4	23.00	10.00	12.9	M10 × 17	16.0	8.50	20.5	103,800	146,710	2.08
HGL45HA							80	128.8	171.2	28.90							125,300	191,850	2.75
HGL55CA	70	13.0	23.5	100	75	12.5	75	117.7	166.7	27.35	11.00	12.9	M12 × 18	17.5	12.00	19.0	153,200	211,230	3.25
HGL55HA							95	155.8	204.8	36.40							184,900	276,230	4.27

¹⁾ 98.8 for type SE

²⁾ 121.8 for type SE

For dimensions of the rail, see Page 43, for standard as well as optional lubrication adapter, see Page 152.

3.1.10 Dimensions of the HG rail

The HG profile rail is used for both the HG and QH blocks.

3.1.10.1 Dimensions HGR_R

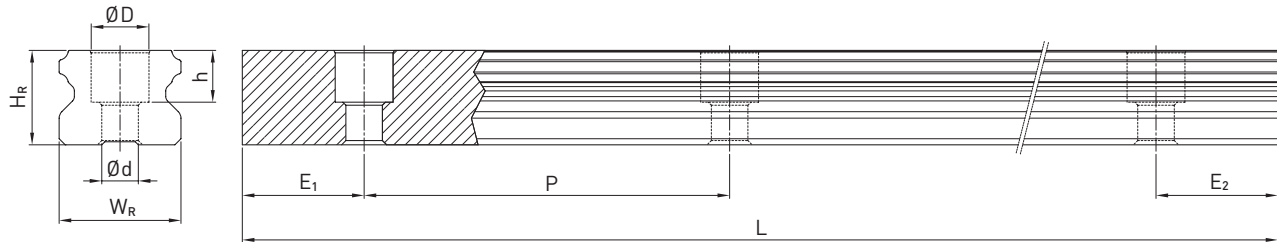


Table 3.9 Dimensions of profile rail HGR_R

Series/size	Assembly screw for rail [mm]	Dimensions of the rail [mm]						Max. length [mm] ²⁾	Max. length E ₁ = E ₂ [mm]	Min. length [mm]	E _{1/2} min [mm]	E _{1/2} max [mm]	Weight [kg/m]
		W _R	H _R	D	h	d	P						
HGR15R	M4 × 20	15	15.0	7.5	5.3	4.5	60	4,000	3,900	72	6	54	1.45
HGR20R	M5 × 20	20	17.5	9.5	8.5	6.0	60	4,000/5,600 ¹⁾	3,900/5,520 ¹⁾	74	7	53	2.21
HGR25R	M6 × 25	23	22.0	11.0	9.0	7.0	60	4,000/5,600 ¹⁾	3,900/5,520 ¹⁾	76	8	52	3.21
HGR30R	M8 × 30	28	26.0	14.0	12.0	9.0	80	4,000/5,600 ¹⁾	3,920/5,520 ¹⁾	98	9	71	4.47
HGR35R	M8 × 35	34	29.0	14.0	12.0	9.0	80	4,000/5,600 ¹⁾	3,920/5,520 ¹⁾	98	9	71	6.30
HGR45R	M12 × 45	45	38.0	20.0	17.0	14.0	105	4,000/5,600 ¹⁾	3,885/5,460 ¹⁾	129	12	93	10.41
HGR55R	M14 × 55	53	44.0	23.0	20.0	16.0	120	4,000/5,600 ¹⁾	3,840/5,440 ¹⁾	148	14	106	15.08
HGR65R	M16 × 65	63	53.0	26.0	22.0	18.0	150	4,000/5,600 ¹⁾	3,750/5,350 ¹⁾	180	15	135	21.18

¹⁾ Optional type on request

²⁾ Max. length of corrosion-resistant steel: 1,860mm

3.1.10.2 Dimensions HGR_T

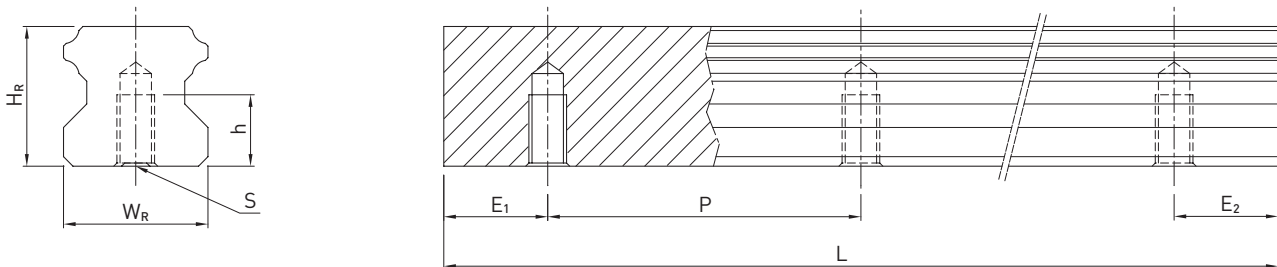


Table 3.10 Dimensions of profile rail HGR_T

Series/size	Dimensions of the rail [mm]					Max. length [mm] ²⁾	Max. length E ₁ = E ₂ [mm]	Min. length [mm]	E _{1/2} min [mm]	E _{1/2} max [mm]	Weight [kg/m]
	W _R	H _R	S	h	P						
HGR15T	15	15.0	M5	8	60	4,000	3,900	72	6	54	1.48
HGR20T	20	17.5	M6	10	60	4,000	3,900	74	7	53	2.29
HGR25T	23	22.0	M6	12	60	4,000	3,900	76	8	52	3.35
HGR30T	28	26.0	M8	15	80	4,000	3,920	98	9	71	4.67
HGR35T	34	29.0	M8	17	80	4,000	3,920	98	9	71	6.51
HGR45T	45	38.0	M12	24	105	4,000	3,885	129	12	93	10.87
HGR55T	53	44.0	M14	24	120	4,000	3,840	148	14	106	15.67
HGR65T	63	53.0	M20 ¹⁾	30	150	4,000	3,750	180	15	135	21.73

¹⁾ Deviates from DIN 645

²⁾ Max. length of corrosion-resistant steel: 1,860mm

Note:

1. The tolerance for E is +0.5 to -1 mm for standard, for joint connections 0 to -0.3 mm.

2. If no information is provided on the E_{1/2} dimensions, the maximum number of mounting holes is determined taking into account E_{1/2} min.

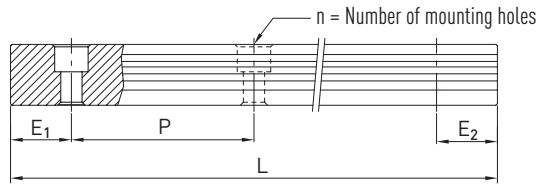
3. The rails are shortened to the desired length. If no information on the E_{1/2} dimensions is provided, then the rails are manufactured symmetrically.

Linear guideways

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3.1.10.3 Calculation of the length of profile rails

HIWIN offers profile rails in customised lengths. To make sure the end of the profile rail does not become unstable, the value E should not exceed half the distance between the mounting holes (P). At the same time, the value $E_{1/2}$ should be between $E_{1/2 \text{ min}}$ and $E_{1/2 \text{ max}}$ so that the mounting hole does not break out.



F 3.2

$$L = (n - 1) \times P + E_1 + E_2$$

L Total length of the profile rail [mm]

n Number of mounting holes

P Distance between two mounting holes [mm]

$E_{1/2}$ Distance from the centre of the last mounting hole to the end of the profile rail [mm].

3.1.10.4 Cover caps for mounting holes of profile rails

The cover caps are used to keep the mounting holes free of chips and dirt. The standard plastic cover caps accompany each profile rail. Optional cover caps have to be ordered separately.



Table 3.11 Cover caps for mounting holes of profile rails

Rail	Screw	Article number			Ø D [mm]	Height H [mm]
		Plastic (200 units)	Brass ¹⁾	Steel ¹⁾		
HGR15R	M4	5-002218	5-001344	—	7.5	1.2
HGR20R	M5	5-002220	5-001350	5-001352	9.5	2.5
HGR25R	M6	5-002221	5-001355	5-001357	11.0	2.8
HGR30R	M8	5-002222	5-001360	5-001362	14.0	3.5
HGR35R	M8	5-002222	5-001360	5-001362	14.0	3.5
HGR45R	M12	5-002223	5-001324	5-001327	20.0	4.0
HGR55R	M14	5-002224	5-001330	5-001332	23.0	4.0
HGR65R	M16	5-002225	5-001335	5-001337	26.0	4.0

¹⁾ Not recommended for coated rails.

3.1.11 Sealing systems

Different sealing systems are available for HIWIN blocks. You can find an overview on Page 24. The following table shows the total length of the blocks with different sealing systems. Appropriate sealing systems are available for these sizes.

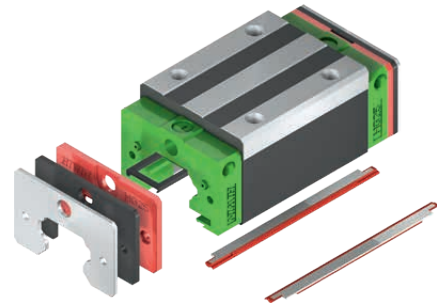


Table 3.12 Total length of block with different sealing systems

Series/size	Total length L (including screws)									
	SS	SSL	ZZ	ZZX	DD	KK	KKX	SW	ZW	ZWX
HG_15C	61.4	61.4	69.0	69.0	68.0	75.6	75.6	63.2	71.0	71.0
QH_15C	61.4	—	68.4	—	68.0	75.0	—	—	—	—
HG_20S	56.5	56.5	57.5	57.5	59.5	62.5	62.5	57.5	—	61.3
HG_20C	77.5	77.5	82.5	82.5	82.5	87.5	87.5	78.5	86.3	82.3
QH_20C	76.7	—	81.9	—	81.7	86.9	—	—	—	—
HG_20H	92.2	92.2	97.2	97.2	97.5	102.2	102.2	93.2	101.0	97.0
QH_20H	91.4	—	96.6	—	96.4	101.6	—	—	—	—
HG_25C	84.0	84.0	89.0	92.0	89.0	94.0	97.0	85.0	92.8	91.8
QH_25C	83.4	—	89.4	—	88.4	94.4	—	—	—	—
HG_25H	104.6	104.6	109.6	112.6	109.6	114.6	114.6	105.6	113.4	112.4
QH_25H	104.4	—	110.0	—	109.0	115.0	—	—	—	—
HG_30C	97.4	97.4	105.4	108.4	104.8	112.8	115.8	99.0	107.2	105.8
QH_30C	97.4	—	104.8	—	104.8	112.2	—	—	—	—
HG_30H	120.4	120.4	128.4	131.4	127.8	135.8	138.8	122.0	130.2	128.8
QH_30H	120.4	—	127.8	—	127.8	135.2	—	—	—	—
HG_35C	112.4	—	120.4	123.4	119.8	127.8	130.8	115.2	123.4	122.4
QH_35C	113.6	—	119.0	—	118.6	124.0	—	—	—	—
HG_35H	138.2	—	146.2	149.2	145.6	153.6	156.6	141.0	149.2	148.2
QH_35H	139.4	—	144.8	—	144.4	149.8	—	—	—	—
HG_45C	139.4	—	150.0	153.0	149.4	160.0	160.0	140.0	148.8	144.8
QH_45C	139.4	—	147.2	—	146.6	154.4	—	—	—	—
HG_45H	171.2	—	181.8	184.8	181.2	191.8	194.8	171.8	180.6	176.6
QH_45H	171.2	—	179.0	—	178.4	186.2	—	—	—	—
HG_55C	166.7	—	177.1	180.1	177.1	187.5	190.5	163.7	—	172.9
HG_55H	204.8	—	215.2	218.2	215.2	225.5	228.5	201.8	—	211.0
HG_65C	200.2	—	208.2	211.2	209.2	217.2	220.2	196.2	—	203.4
HG_65H	259.6	—	267.6	270.6	268.6	276.6	258.6	255.6	—	262.8

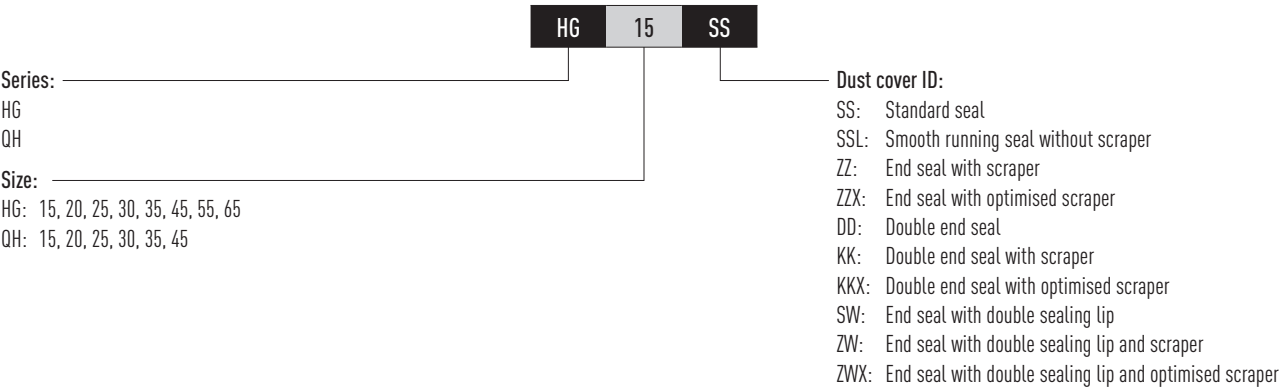
Unit: mm

Linear guideways

HG/QH series

3.1.11.1 Designation of the seal sets

The seal sets are always shipped complete with the installation materials and include the supplemental parts for the standard seal.



3.1.12 Long-term lubrication unit

Further information on the lubrication unit can be found in the general information in section "2.6.3 Long-term lubrication unit" on Page 17.

The following drawing shows the dimension (L) for a single-sided lubrication unit (standard). The dimension for a double-sided lubrication unit results from the dimension $L + V + T$. The E2 long-term lubrication unit is available with the sealing systems named in the table.

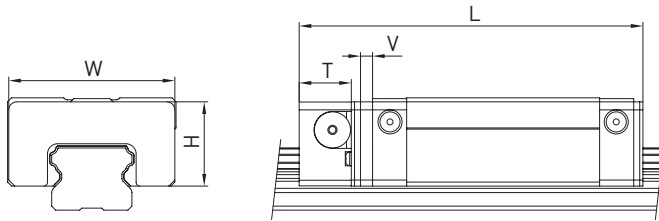


Table 3.13 Dimensions of the block with lubrication unit E2

Model	Dimensions of the block [mm]								Max running performance ²⁾ [km] E2 single-sided	Max running performance ²⁾ [km] E2 double-sided
	W	H	T	V	L _{SS} ¹⁾	L _{ZZ} ¹⁾	L _{DD} ¹⁾	L _{KK} ¹⁾		
HG_15C	32.4	19.5	12.5	3.0	75.4	80.5	82.0	87.1	10,000	20,000
QH_15C	32.4	19.5	12.5	3	75.4	–	–	–	20,000	30,000
HG_20S	43.0	24.4	13.5	3.5	70.9	73.0	75.0	78.0	10,000	20,000
HG_20C	43.0	24.4	13.5	3.5	93.5	95.6	97.5	100.6	10,000	20,000
QH_20C	43	24.4	13.5	3.5	93.1	–	–	–	20,000	30,000
HG_20H	43.0	24.4	13.5	3.5	108.2	110.2	112.2	115.2	10,000	20,000
QH_20H	43	24.4	13.5	3.5	107.8	–	–	–	20,000	30,000
HG_25C	46.4	29.5	13.5	3.5	100.0	102.0	104.0	107.0	10,000	20,000
QH_25C	46.4	29.5	13.5	3.5	100.2	–	–	–	20,000	30,000
HG_25H	46.4	29.5	13.5	3.5	120.6	122.6	124.6	127.6	10,000	20,000
QH_25H	46.4	29.5	13.5	3.5	120.8	–	–	–	20,000	30,000
HG_30C	58.0	35.0	13.5	3.5	112.9	118.0	119.9	125.0	10,000	20,000
QH_30C	58	35	13.5	3.5	112.9	–	–	–	20,000	30,000
HG_30H	58.0	35.0	13.5	3.5	135.9	141.0	142.9	148.0	10,000	20,000
QH_30H	58	35	13.5	3.5	135.9	–	–	–	20,000	30,000
HG_35C	68.0	38.5	13.5	3.5	127.9	133.4	135.3	140.8	10,000	20,000
QH_35C	68	35.5	16	3.5	129.3	–	–	–	20,000	30,000
HG_35H	68.0	38.5	13.5	3.5	153.7	159.2	161.1	166.6	10,000	20,000
QH_35H	68	35.5	16	3.5	155.1	–	–	–	20,000	30,000
HG_45C	82.0	49.0	16.0	4.5	157.2	162.1	166.1	171.7	10,000	20,000
QH_45C	82	49	16	4.5	158.3	–	–	–	20,000	30,000
HG_45H	82.0	49.0	16.0	4.5	189.0	193.9	197.9	203.5	10,000	20,000
QH_45H	82	49	16	4.5	190.1	–	–	–	20,000	30,000
HG_55C	97.0	55.5	16.0	4.5	183.9	189.6	193.8	200.0	10,000	20,000
HG_55H	97.0	55.5	16.0	4.5	222.0	227.7	231.9	238.1	10,000	20,000
HG_65C	121.0	69.0	16.0	4.5	219.2	220.7	226.7	229.7	10,000	20,000
HG_65H	121.0	69.0	16.0	4.5	278.6	280.1	286.1	289.1	10,000	20,000

¹⁾ Total length depending on the selected dust protection. SS = Standard dust protection

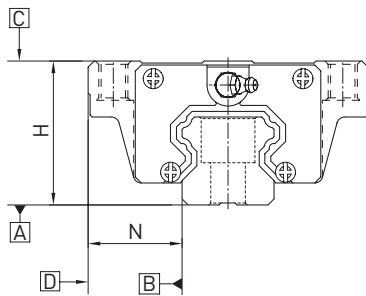
²⁾ Further details can be found in the assembly instructions in the "Lubrication" chapter

Linear guideways

HG/QH series

3.1.13 Tolerances depending on the accuracy class

The HG and QH series are available in five accuracy classes according to the parallelism between block and rail, height accuracy H and width accuracy N. The selection of the accuracy class is determined by the requirements of the machine.



3.1.13.1 Parallelism

Parallelism of locating surfaces D and B of the block and rail and of top block surface C to mounting surface A of the rail. Ideal installation of the linear guideway and the measurement in the centre of the block are prerequisites.

Table 3.14 Tolerance of parallelism between block and profile rail

Rail length [mm]	Accuracy class				
	C	H	P	SP	UP
– 100	12	7	3	2	2
100 – 200	14	9	4	2	2
200 – 300	15	10	5	3	2
300 – 500	17	12	6	3	2
500 – 700	20	13	7	4	2
700 – 900	22	15	8	5	3
900 – 1100	24	16	9	6	3
1100 – 1500	26	18	11	7	4
1500 – 1900	28	20	13	8	4
1900 – 2500	31	22	15	10	5
2500 – 3100	33	25	18	11	6
3100 – 3600	36	27	20	14	7
3600 – 4000	37	28	21	15	7

Unit: μm

3.1.13.2 Accuracy – height and width

Height tolerance of H

Permissible absolute dimension deviation of height H, measured between the centre of bolting surface C and rail underside A, with any position of the block on the rail.

Height variance of H

Permissible deviation of height H between several blocks on one rail, measured at the same position of the rail.

Width tolerance of N

Permissible absolute dimension deviation of width N, measured between the centre of bolting surfaces D and B, with any position of the block on the rail.

Width variance of N

Permissible deviation of width N between several blocks on one rail, measured at the same position of the rail.

Table 3.15 Tolerances of width and height

Series/size	Accuracy class	Height tolerance of H	Width tolerance of N	Height variance of H	Width variance of N
HG_15, 20 QH_15, 20	C (Normal)	± 0.1	± 0.1	0.02	0.02
	H (high)	± 0.03	± 0.03	0.01	0.01
	P (precision)	0/- 0.03 ¹⁾ ± 0.015 ²⁾	0/- 0.03 ¹⁾ ± 0.015 ²⁾	0.006	0.006
	SP (super precision)	0/- 0.015	0/- 0.015	0.004	0.004
	UP (ultra precision)	0/- 0.008	0/- 0.008	0.003	0.003
HG_25, 30, 35 QH_25, 30, 35	C (Normal)	± 0.1	± 0.1	0.02	0.03
	H (high)	± 0.04	± 0.04	0.015	0.015
	P (precision)	0/- 0.04 ¹⁾ ± 0.02 ²⁾	0/- 0.04 ¹⁾ ± 0.02 ²⁾	0.007	0.007
	SP (super precision)	0/- 0.02	0/- 0.02	0.005	0.005
	UP (ultra precision)	0/- 0.01	0/- 0.01	0.003	0.003
HG_45, 55 QH_45	C (Normal)	± 0.1	± 0.1	0.03	0.03
	H (high)	± 0.05	± 0.05	0.015	0.02
	P (precision)	0/- 0.05 ¹⁾ ± 0.025 ²⁾	0/- 0.05 ¹⁾ ± 0.025 ²⁾	0.007	0.01
	SP (super precision)	0/- 0.03	0/- 0.03	0.005	0.007
	UP (ultra precision)	0/- 0.02	0/- 0.02	0.003	0.005
HG_65	C (Normal)	± 0.1	± 0.1	0.03	0.03
	H (high)	± 0.07	± 0.07	0.02	0.025
	P (precision)	0/- 0.07 ¹⁾ ± 0.035 ²⁾	0/- 0.07 ¹⁾ ± 0.035 ²⁾	0.01	0.015
	SP (super precision)	0/- 0.05	0/- 0.05	0.007	0.01
	UP (ultra precision)	0/- 0.03	0/- 0.03	0.005	0.007

Unit: mm

¹⁾ Assembled linear guideway

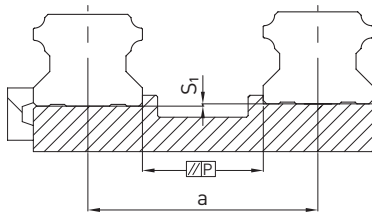
²⁾ Unassembled linear guideway

Linear guideways

HG/QH series

3.1.13.3 Permissible tolerances of the mounting surface

Once the requirements for the accuracy of the mounting surfaces are met, the high accuracy, rigidity and service life of the HG and QH series linear guideways are achieved.



Tolerance of parallelism of reference surface (P):

Table 3.16 Maximum tolerance for parallelism (P)

Series/Size	Preload class		
	Z0	ZA	ZB
HG/QH_15	25	18	—
HG/QH_20	25	20	18
HG/QH_25	30	22	20
HG/QH_30	40	30	27
HG/QH_35	50	35	30
HG/QH_45	60	40	35
HG_55	70	50	45
HG_65	80	60	55

Unit: μm

Tolerance of height of reference surface (S_1):

F 3.3

$$S_1 = a \times K$$

S_1 Maximum height tolerance [mm]

a Distance between rails [mm]

K Coefficient of height tolerance

Table 3.17 Coefficient of height tolerance (K)

Series/Size	Preload class		
	Z0	ZA	ZB
HG/QH_15	2.6×10^{-4}	1.7×10^{-4}	—
HG/QH_20	2.6×10^{-4}	1.7×10^{-4}	1.0×10^{-4}
HG/QH_25	2.6×10^{-4}	1.7×10^{-4}	1.4×10^{-4}
HG/QH_30	3.4×10^{-4}	2.2×10^{-4}	1.8×10^{-4}
HG/QH_35	4.2×10^{-4}	3.0×10^{-4}	2.4×10^{-4}
HG/QH_45	5.0×10^{-4}	3.4×10^{-4}	2.8×10^{-4}
HG_55	6.0×10^{-4}	4.2×10^{-4}	3.4×10^{-4}
HG_65	7.0×10^{-4}	5.0×10^{-4}	4.0×10^{-4}

3.1.14 Shoulder heights and edge roundings

Inaccurate shoulder heights and edge roundings of mounting surfaces impair accuracy and may conflict with the block or rail profile. The following shoulder heights and edge profiles must be observed to avoid assembly problems.

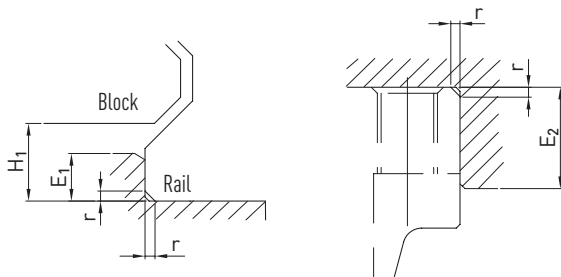


Table 3.18 Shoulder heights and edge roundings

Series/Size	Max. radius of edges r	Shoulder height of the reference edge of rail E ₁	Shoulder height of the reference edge of block E ₂	Clearance height under block H ₁
HG_15	0.5	3.0	4.0	4.3
QH_15	0.5	3.0	4.0	4.0
HG/QH_20	0.5	3.5	5.0	4.6
HG/QH_25	1.0	5.0	5.0	5.5
HG/QH_30	1.0	5.0	5.0	6.0
HG/QH_35	1.0	6.0	6.0	7.5
HG/QH_45	1.0	8.0	8.0	9.5
HG_55	1.5	10.0	10.0	13.0
HG_65	1.5	10.0	10.0	15.0

Unit: mm